

SCIENCE

A WEEKLY JOURNAL DEVOTED TO THE ADVANCEMENT OF SCIENCE, PUBLISHING THE
OFFICIAL NOTICES AND PROCEEDINGS OF THE AMERICAN ASSOCIATION
FOR THE ADVANCEMENT OF SCIENCE.

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FRIDAY, AUGUST 23, 1901.

JOSEPH LE CONTE.

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JOSEPH LE CONTE was born in Liberty county, Georgia, on February 26, 1823; he died in Yosemite Valley, July 6, 1901. In the years spanned by these dates he lived a life well worthy of respectful commemoration, a life whose record must exercise a benign influence upon the rising generation of scientific workers. To make such a record is not the purpose of this brief article. Here all that may be attempted is a grateful acknowledgment of having known and worked with the man, to outline his career, to indicate the goal he aimed at and the chief turning points on the highway of his life as he pursued that goal, and to make some loving comment on the most salient features of his personality. To those who feel keenly, as the writer does, the imperfection of this sketch, it will be a satisfaction to know that at the time of his death Professor Le Conte was engaged upon, and had practically completed, his autobiography, and that this will be published at an early date.

Joseph Le Conte was of French descent. His earliest American ancestor was Guillaume Le Conte, a Huguenot, who fled from Rouen after the revocation of the edict of Nantes, served under William of Orange in England, and finally settled in this country near New York, in the year 1698. His grandson Louis was born in 1782, graduated

from Columbia in 1800, and in 1810 moved to Liberty county, Georgia, where he had inherited a large plantation. Here he married Ann Quarterman, a lady of English Puritan descent. Of these parents Joseph Le Conte was born, one of a family of four sons and three daughters.

Louis Le Conte divided his time between the management of his estate and the pursuit of scientific studies, particularly chemistry and botany. He maintained a botanical garden which was famous in its day as one of the best in the country. Joseph Le Conte received his elementary education at a local school, but his father's tastes and scientific work exercised a powerful influence upon his youthful mind as it did also upon that of his brother John, and both were early drawn to the pursuit of science as their life work.

In those days almost the only profession that afforded an opening to scientific pursuit was that of medicine, so that, after graduating from the University of Georgia, both brothers entered upon the medical course at the College of Physicians and Surgeons, in New York, Joseph receiving the degree of M.D. in 1845.

It was in the summer vacation of 1844, when a young man of 21, that Joseph Le Conte made his first noteworthy geological excursion. In this year he joined the *first* prospecting and exploring expedition to the now famous mining district of the south shore of Lake Superior. The writer has several times listened with delight to Professor Le Conte's account of this boating cruise from the lower lakes to Keewenaw Point, of his camping adventures, and how, after a sojourn of a few weeks with the prospectors on Keewenaw Point, he and his cousin with some Indians proceeded on a long canoe voyage along the south shore to the present site of Duluth, and thence to the upper waters of the Mississippi and down to the Falls of St. Anthony, long before a

cabin existed on the site of the cities of Minneapolis and St. Paul.

After receiving his medical degree he practiced medicine at Macon, Georgia, from 1845 to 1850. In 1847 he married Caroline Elizabeth, the daughter of Alfred M. Nisbet, at Midway, near Milledgeville, Ga. His wife, one son and three daughters survive him. In 1850, feeling doubtless that the practice of medicine failed to afford those opportunities for the study of natural science to which he was so strongly inclined, and being drawn by the fame of Agassiz, he abandoned medicine and went to Cambridge. Here under the influence of the great interpreter of nature, his own career as a devoted student of science was finally determined. It is doubtful whether any other disciple of this great teacher has done more to advance the cause of nature study among the people of this country. In the early part of 1857 he was associated with Agassiz in a study of the keys and reefs of Florida, and it would be difficult to cite a more captivating study for two such kindred spirits, or a study where geological and biological interests are more intimately knit together. Late in the same year, having received the degree of B.S. at Harvard, he returned to Georgia and was elected to the chair of natural science in Oglethorpe University. This post he resigned the following year to accept the chair of geology and natural history in the University of Georgia, in which institution his brother John was the professor of natural philosophy. Here he taught for four years. In 1856 the brothers both resigned their chairs and accepted calls to South Carolina College, at Columbia, Joseph to be professor of geology and natural history and John to be professor of physics. They held these positions till 1862, when the college succumbed to the trouble arising out of the Civil War. These were busy years at Columbia; in the enjoyment of the con-

genial society of the place they were pleasantly spent, though sadly interrupted.

When teaching gave way to more serious duties Joseph offered his services to the Government of the Southern Confederacy, and was for a time engaged as chemist in the government laboratory for the manufacture of medicines, and later as chemist at the Nitre and Mining Bureau at Columbia, of which his brother John had been appointed superintendent. In this work he continued till the close of the war.

In 1866 the University of South Carolina was reorganized and the brothers resumed their professorships. But in the crippled condition of the community it soon became apparent that it would be long before opportunities for scientific work would be opened up. Their private fortune had been swept away by the war, and when in 1868 they were invited to join the initial staff of the University of California, then being organized, they both accepted. At the age of 46 Joseph Le Conte thus became professor of geology, botany and natural history in the University of California. The title of his chair was changed in 1872 to 'geology and natural history,' and this chair he held up to the time of his death.

From this brief sketch of the mere externals of Professor Le Conte's career, the character of his life-work as a student and teacher of natural science must impress the reader. This impression will be sustained and strengthened by a glance at the long list of his writings appended to this article. He was no narrow specialist, yet he was an authority in advance of his contemporaries in several distinct lines of scientific and philosophical inquiry. His earliest writings of scientific importance had to do with the phenomena of binocular vision, which he discussed in a long series of papers, published chiefly in the *American Journal of Science* and in the *Philosophical Magazine*, between the years 1868 and 1880.

These essays were enlarged and published in his well-known book of several editions entitled 'Sight.' This work is generally recognized as an important contribution to our knowledge of the subject and is remarkable for that lucidity of style and felicity of graphic illustration and simile which characterize, indeed, all his writings. While issuing these papers he was, after coming to California, actively engaged in geological studies. Various excursions in the Sierra Nevada and in the Cascade Mountains of Oregon led to important discoveries. He announced the age and character of the Cascade Mountains and their relation to the great Columbia lava flood; he described the ancient glaciers of the Sierra Nevada, and was among the first to recognize the post-Tertiary elevation of the Sierra Nevada, as shown by the river beds. His studies on mountain structure led him to important generalizations on the origin of mountains in general, and he became one of the chief exponents of the 'contractional theory' of mountain building. His studies on ore deposition at Steamboat Springs, Nevada, and Sulphur Bank, California, led him to a discussion of vein formation in general; and his classification of ore deposits has been widely recognized as resting on a sound basis and is not displaced in its essential features by the most recent attempts in the same direction. He also made important contributions to the subjects of seismology and coral growth in its geological aspects.

In 1878, he published his 'Elements of Geology,' a book which has had, perhaps, a more extensive use in the schools and colleges of this country than any other textbook in the natural sciences. This was followed in 1884 by his 'Compend of Geology,' a more elementary treatment of the same work. He was also interested in many other scientific and medical subjects such as 'The Problem of Flight,' 'The Func-

tions of the Liver,' 'Ptomaines and Leucomaines in their Relation to Disease,' 'The Larynx as an Instrument of Music,' etc. The mere mention of these varied subjects indicates the breadth of his interests and sympathies, but they by no means measure his intellectual activity. He was an active and successful exponent of the doctrine of evolution, and extended its principles to many fields of thought. Indeed, the evolutionary idea was the dominant note in nearly all his many philosophical writings and addresses. His strong advocacy of evolution as a principle running through all nature may be regarded as the most fruitful of his life's labors. On the battle ground, not long since so fiercely contested, between science and religion, he did splendid work, not, however, intensifying and embittering the strife, but in the work of conciliation, in the demonstration to thoughtful man in the camp of the churches that there could be no real conflict between seekers for truth whether in the pulpit or in the laboratory; that science sought simply the truth, nothing more, nothing less, and that in so far as scientific truth rested on a verifiable basis it was futile for the church to assail it.

But science, philosophy and religion failed to suffice his vigorous intellectual appetite. He was strongly interested in art; and the principles of art and their relation to science was one of his favorite themes.

It is needless to say that a man so fruitful of ideas as Professor Le Conte, so happy and so forceful in their expression, was eminently successful as a lecturer and public speaker. While he rather shrank from extempore addresses he was always willing to speak on public occasions and was always in demand.

Professor Le Conte's scientific work and influence extended beyond the writing of papers and books. He entered heartily

into the scientific life of the nation and took an active interest in various organizations which have for their purpose the strengthening and extending the love of science among the people. He was a member of the National Academy of Sciences, associate fellow of the American Academy of Arts and Sciences, corresponding member of the New York Academy of Sciences, member of the American Philosophical Society, fellow of the American Association for the Advancement of Science and past-president of the same, fellow of the Geological Society of America and past-president of the same, life member of the California Academy of Sciences, member of the Boston Society of Natural History, honorary member of the Brooklyn Ethical Association, member of the Iowa Academy of Sciences, member of the Davenport Academy of Sciences, member of the American Institute of Mining Engineers, member of the National Geographical Society, member of the International Geological Congress and once vice-president of the same, member of the California State Medical Society, honorary member of the South Carolina State Medical Society. He was also associated with the editorship of the *Journal of Geology* and of *SCIENCE*.

While Professor Le Conte, by his writings and by his active participation in the proceedings of the various societies just mentioned, had become a force in the intellectual life of the nation, this was only one element of his remarkable strength at the University of California. Here his intellectual achievements were overshadowed by the great and remarkable personality of the man. His singularly sweet and simple character seemed to seize upon all who came in contact with him and bind them to him as admiring friends. Indirection in any of its forms was utterly foreign to his nature. He was true to his ideals throughout life and his influence in the University

was always for the noblest and best in human effort. While too engrossed in his scientific and philosophic writings to take the initiative in University or public affairs, he was ever in touch with the progress of the time, and ever sympathetic and healthful in advance movements. He was of an exceptionally cheerful and happy disposition and was possessed of a fund of humor that made him a sparkling and entertaining conversationalist. He had the graces and manner and speech and chivalric instincts of a gentleman of the old southern school. He was beloved by the whole University, and with increasing years this love became a sort of veneration, so that he was in the later years of his life the veritable idol of the University community.

His death, without lingering pain, in the midst of the grand Sierra that he loved so well, surrounded by many of his friends, was a fitting close to his long life. His kindly presence and benign influence will long live in the memory of the University, and in the world of science he has certainly established for himself a monument more lasting than brass.

ANDREW C. LAWSON.

UNIVERSITY OF CALIFORNIA.

AN AMERICAN SENATE OF SCIENCE.

WHEN in the course of human events the most vigorous colonies of the New World deemed it necessary to found a nation, they cast aside tradition and example and invented a system of government based on the theory of human equality. The movement opened a new chapter in the history of nations; earlier governments grew into form much as the primitive implement takes shape by continued use, but this was a distinct creation, like the complex tool invented and made for a purpose; and the fundamental theory was new in application if not in thought. The invention of the colonists was applied experimentally, and

worked well; minor changes were found needful here and there in the adjustment of the mechanism to its work, yet remarkably enough the most sweeping changes led directly toward the fundamental theory of equality; and for a century and a quarter the world's first invented government has proved the world's most successful government. The device of governing by the people for the people was adopted by the component organizations with equally satisfactory results. The colonies, and after them the states, rested on the fundamental theory; the municipalities followed; counties and townships and villages adopted practice and theory together; and political organizations sprang from the theory to shape the practice of governmentation. In the smaller organizations as in the larger the governmental mechanism has worked well; difficulties have arisen, yet remarkably enough most of these have resulted from the opposition of one-man power to the theory of equal rights; and the world's most striking examples of growth in cities and States are found in numbers in the nation invented by its founders.

The essential mechanism of the invented government was that of control by equitably selected representatives. Provision for keeping the control adjusted to current needs was made by limiting tenure of office and excluding hereditary privilege; while provision against undue instability was made by arranging for the equitable selection of representatives of a second order, *i. e.*, representatives of representatives. In that branch of the government performing legislative (or constructive) functions, these representatives of representatives are organized in senates, whose powers are coordinate with those of the primary representative bodies. In general terms, the representative body is the progressive factor, the senate the conservative factor, of the body-politic; and it is the special function of the

senate to coordinate spontaneous movements, and thus to perpetuate the integrity and vitality of the organization. To borrow analogy from planetary assemblages, the representative body is as the centrifugal force, the senate as the centripetal force, combined in orbital progression. The important fact is that political organization of the modern and successful sort is incomplete without provision for the maintenance of internal harmony, of stability, of vitality—as in the senates of the invented nation and its constituent states.

Now America has become a nation of science. An unequaled proportion of her citizens are engaged in scientific research, while it is not too much to say that the masses of the people recognize the principles as well as the applications of science in their everyday avocations; the scientific spirit is fostered and diffused by a number of voluntary associations of scientific character probably larger in proportion to population than can be found in any other country; and our statesmen are guided by the conclusions of science, while our federal and State governments support science, in unequaled degree. Yet despite their activity and numbers, despite the extent and strength of their voluntary associations, American scientists have not profited by the example of the nation's founders, and have taken no steps toward shaping the further progress of science by representative organization. Many, if not most, of the voluntary associations indeed have executive bodies to exercise appropriate administrative and judicative functions, and perhaps to propose legislative action; but this mechanism merely simplifies the transaction of business, the powers of the elected representatives are limited to the affairs of a particular association of which the body is a part, and there are no representatives of the second order—no representatives of representatives—empowered to

act in the interests of science in general. It is not, of course, the function of science to govern, so that governmental organization *per se* is not required on the part of scientific men or their associations; but collective action for common interests demands organization—and one of the surprising features of American science (especially in view of the example set by statecraft) is its unorganized condition. True, each special science is fostered by one or more voluntary associations, sometimes of national character; true, general science is represented in each principal city by one or more voluntary associations, perhaps loosely confederated, as in New York and Washington; true, some fields of research have been preempted by the federal government in the public interest; true, different sciences are cultivated by the aid of special journals; yet the great fact remains that the scientists and scientific interests of America are not well coordinated, much less unified in a symmetric whole. The centrifugal tendency is strong; the centripetal factor requisite for independent character is lacking.

An effective mode of organizing American science is suggested by the constructive organization of the nation in which scientific progress has been most rapid—it is that of organizing the voluntary associations in what might be called a Senate of American Science. The successful example of American nationality would suggest that such a senate should be made up of delegates chosen by the voluntary scientific associations of the country, for limited terms, in numbers equitably proportionate to the size of the representative associations. The functions of the general body would naturally include (1) coordinating scientific interests and progress; (2) representing science in its broader aspects on behalf of the country; (3) forming a nucleus for scientific congresses, national and international; (4) fixing the bases of represen-

tation of the primary associations; and fulfilling any other duties connected with scientific interests and its own maintenance.

Two methods of procedure toward the organization of such a Senate of Science present themselves: The first suggestion is that of creation *de novo*, on the initiation of a few leaders in scientific thought. The chief advantage of this method would seem to lie in the freedom from entangling alliances; the chief obstacle would seem to grow out of the large initial energy required to set the mechanism in effective operation. The second suggestion is that of utilizing some existing organization, naturally of national character, as a nucleus. The chief advantage of this method would be that of economy in initial energy; while a serious obstacle might grow out of the indisposition of any existing association of national character to undertake the necessary reorganization. As between the two methods suggested, the sum of theoretical advantages would seem to favor the independent organization; though it might easily be that practical considerations would turn the advantage toward the method of reorganization of an existing society.

On reviewing the societies which might yield a nucleus for a national Senate of Science, several would seem worthy of consideration on various grounds; yet such consideration would seem to eliminate all but two or three from final review. These are (1) the American Association for the Advancement of Science, the oldest of our national scientific societies of general character, and the one most completely in touch with the scientists of the entire country; (2) the National Academy of Sciences, the most dignified and exclusive of our voluntary associations of scientific character; and perhaps (3) the Washington Academy of Sciences, one of the youngest and most vigorous of our scientific organizations, and

one already possessing (at least in inchoate form) a confederate character.

The availability of the last-named organization would seem questionable, primarily on the ground of its local character, partly because of its youth and the consequent uncertainty as to its real character and actual prospects. Although apparently available on casual consideration, the National Academy would seem on closer scrutiny to be fundamentally unsuitable as a nucleus for a coordinative super-organization; for it is based largely on foreign models, is out of accord with the theory and the practice of popular government, and has developed functions diametrically antagonistic to the limited tenure and representative character which would seem requisite for the success of a working senate. True, its membership comprises the most honored names in American science, men whose prestige and support would doubtless be essential to the success of a more general organization; but it would appear probable that most of the working members of this dignified body would enter in due course, by virtue of their standing, into a representative organization. The remaining society (the American Association for the Advancement of Science) would seem to offer an available nucleus through its Council, a body already representative in that it is made up largely of delegates nominated in the several nearly independent sections. It has the further advantage of serving already as a nucleus for other scientific organizations, a number of which meet with it annually, contributing materially to its standing and its influence on current thought concerning matters of scientific interest. This aspect of the Association and its Council was brought out clearly in a recent number of *SCIENCE*, and the exposition need not now be repeated; it suffices to note that the organization of the Association, its large and widely dis-

tributed membership, its strong hold on the sympathies of scientific men, the high appreciation in which it is held throughout the country, and the appropriate constitution of its Council, all point to the American Association for the Advancement of Science as a suitable nucleus for a Senate of Science—whenever the time arrives for establishing such an organization.

An obstacle in the way of instituting an American scientific body of general character may be noted: Our country is one of magnificent distances, so that the cost of attending meetings or sessions is necessarily large; and equitable representation in a general body would seem to require provision for meeting costs of travel incurred by delegates. Doubtless this could be effected through *pro rata* assessment on the constituent associations, if the central organization were once well under way; and it is possible that the burden might be measurably diminished by migratory meetings, after the fashion of the associations for the advancement of science in different countries. The difficulty might perhaps be overcome by securing a foundation through donation, bequest, or otherwise; certainly it is not insuperable in these days of unprecedented scientific prestige, and of rapid increase in material prosperity through the applications of science.

Summarily, it would seem appropriate for American scientists to draw inspiration and suggestion from American statecraft as to organization; it would seem timely to start a movement toward the more comprehensive organization of American science in connection with the first great assemblage of scientific men in the western half of the country; and it would seem especially fitting to initiate the movement at the approaching meeting in Denver of that organization which would most properly serve as a nucleus for an American Senate of Science.

W J M.

SOME STRANGE PRACTICES IN PLANT NAMING.

IN a recent issue of the *Bulletin* of the Catholic University of Washington, the distinguished professor of botany in that institution, Dr. Edward L. Greene, presents what he announces to be the first of a series of papers entitled 'Some Literary Aspects of American Botany.' It should be a source of gratification to the whole scientific fraternity that public attention has been thus called to the philological abuses so prevalent among the latter-day writers. This first paper contains a trenchant and forcible criticism of the titles applied to many recent botanical serials; and the author's commentary on such examples as 'Contributions to the Myxogasters of Maine,' and 'Contributions from the Herbarium of Franklin and Marshall College' is scarcely less instructive than entertaining.

It is a significant fact that this article by Professor Greene has already elicited a paper on a kindred topic, written by Dr. P. A. Rydberg and published in *Torreyia* for June. As the latter author confines himself, however, to a discussion of personal specific names and their mode of construction, I may be permitted to offer a brief commentary on the subject of plant names in general, from both the orthographical and etymological standpoint.

It has always been a widely accepted principle of scientific nomenclature that a specific once published cannot be subsequently altered in form except upon 'reasonable grounds'; but there has been, and still continues to be, a wide divergence of opinion as to what constitutes reasonable grounds for such alteration. The author of the name has usually been allowed more latitude in this respect than other writers; and in past botanical literature there are consequently many changes in orthography, corrections of typographical errors, etc., made either by the author himself, or more

frequently by other writers who may have had occasion to review his work. These alterations extend all the way from simple substitutions of one letter for another to the replacement of the name itself, generic or specific or both, by an appellation considered more appropriate. When to this uncertain element in plant nomenclature we add the whole vexed question of the principle of priority and the subject of type determination, it seems remarkable that in the progress of botanical science so few opposing schools of belief have been developed.

It may be profitable to give some consideration to the various views that have been entertained regarding the extent of alteration permissible in the case of incorrect or inappropriate scientific names. For convenience in discussion the various categories under which changes have been made will be taken up under separate headings.

1. *False Descriptive Names.*—Botanical nomenclature includes countless numbers of these, many of which have found acceptance from time immemorial. Thus *Polygala* is wholly destitute of milky juice; the stem-leaves of *Campanula rotundifolia*, which are frequently the only leaves discernible at maturity, are narrowly linear; *Viola villosa* is in no sense villous; and *Lunaria annua* is usually biennial. While the modern nomenclator would find little support in an attempt to change such names on the ground of their unsuitability, the practice was common among writers of the first half of the nineteenth century, as well as among the immediate successors of Linnaeus. Rafinesque, in particular, was fond of reading the riot act to his contemporaries for what he considered an outrageous disregard of natural characters in the assignment of plant names, as the following verbatim passage, selected at random from the 'New Flora of North America' (Vol. 2, page 95) will show:

"My genus *Diplostelma*, which Nuttall

had wrongly reduced to *Actinocarpus*, in Collins' herb. (there is no such genus, he meant probably *Actinospermum* of Elliott) has been described by him under the name *Chetanthera* in his new plants. * * * My name is the best, although Nuttall's dates of 1834, *Chetanthera* means bristly anthers, while this is not the case, he ought to have named it *Chetopappus*, but as the pappus is double and different mine is the best, and must be retained."

In the case of *Lunaria annua* mentioned above, published by Linnaeus in 1753, we find that Moench subsequently altered the name to *biennis* in recognition of its biennial character. Writers like Bentham and Gray did not adopt this extreme view, but if in the transfer of a species from one genus to another the specific designation became inappropriate through duplication of the idea contained in the generic name, they invariably took the liberty of changing it. Thus when *Anemonella thalictroides* was transferred to *Thalictrum*, it became *Thalictrum anemonoides*. Inasmuch as the acceptance of such a combination as '*Thalictrum thalictroides*' would imply an agreement with the doctrine of the entity of specific names it was entirely natural and logical for Bentham and his associates, who were strong opponents of that doctrine, to consider such cases exceptional to the rule of priority. If, however, we admit that a specific name is meaningless when disassociated with a generic, there seems no good reason why we should not continue the process of alteration, and follow in the footsteps of the immediate post-Linnaeans. There can be no half-way ground between him who would substitute '*biennis*' for '*annua*' on the one hand, and the botanist who believes in the immutability of specific names on the other.

2. *False Locality Names.*—The writings of Linnaeus and his contemporaries abound in instances of this sort. In many cases

the anomaly that now exists in such specifics as *Berberis Canadensis* and *Cercis Canadensis*—neither of the plants mentioned occurring beyond the Carolinian zone—results from the ignorance of geography displayed by the Old-World botanists of that day; frequently it is due to the great political changes that have taken place in this country during the last one hundred and fifty years. Even in modern times it is a common occurrence for a species to receive its designation from the State in which it was first discovered; and the fact that it may subsequently be found to extend into many other States has never been considered a sufficient reason for renaming it. But what are we to say of *Asclepias Syriaca*, which is exclusively an American milkweed? Decaisne promptly renamed it *Asclepias Cornuti*, and in this he was followed by Gray and other botanists. There are several writers of the present day who favor the alteration of names that state a geographical untruth.

A large number of genera, dedicated to individuals, have been incorrectly spelled, either through the author's ignorance or the compositor's blunder. Examples are Nuttall's *Wisteria*, dedicated to Dr. Wistar; Brown's *Lechenaultia*, named for Leschenault; and Rafinesque's *Scoria*, published as a misprint for *Hicoria*. De Candolle's rule in this connection was: "When a name is drawn from a modern language it is to be maintained just as it was made, even in the case of the spelling having been misunderstood by the author, and justly deserving to be criticized." Dr. Gray considered this rule too absolute, and admitted corrections not only of orthography, but also of errors in the construction of names of Latin or Greek derivation. If the eminent botanist of Harvard University were alive to-day it is to be feared that a large portion of his time would have to be devoted to this work if he wished to thoroughly revise the no-

menclatorial output of the present generation.

3. *Names falsely constructed*.—This includes words derived from modern languages without adaptation to the Latin or Greek form, and those compounded of elements from two or more languages. The writings of Adanson and Necker are full of generic examples of the latter type, and many of these have been taken up under the operation of the law of priority. Of the Adansonian names *Ananas*, *Sesban*, *Cajan*, *Sabal*, *Konig*, *Gansblum*, and *Rulac* it will be observed that none are in strictly correct Latin form, and with the exception of *Konig* and *Gansblum* they are all, I believe, of unknown derivation. It might naturally be inferred that the whole list should stand or fall alike; yet the curious inconsistency is found, that while *Sabal* has been accepted by botanists of every school for several generations, and while *Cajan*, *Sesban* and *Ananas* have been taken up under the Rochester code and are adopted by all its followers, the mere suggestion of *Rulac*, *Gansblum* or *Konig* as generic possibilities is received with amusement or contempt by the average botanist.

Before discussing these latter cases in detail, however, let us refer to the other class in my third category, consisting of so-called hybrid names constructed of elements from two distinct languages. Of these, modern botanical literature is furnishing a rich and ever-increasing store of examples. They may consist: (1) Of Greek terminations welded upon Latin nouns or *vice versa*, resulting in such products as 'graminoides' or the still more remarkable 'cenchrusoides.' (2) They may be compound adjectives, of which one element is Greek, the other Latin; this type is well illustrated by 'pseudocaudatum,' 'polyclavatum' and 'magnasora,' all of which have been recently published in the same journal. (3) Personal generic titles composed of an English proper name with a classical adjective used

as prefix or suffix, like *Vaseyanthus*, *Pringleophytum*, *Neonelsonia*, and *Paleohillia*. It was Dr. Otto Kuntze who astonished the world and carried off the palm in this class by the establishment of such genera as 'Sirhookera' and 'Peckifungus.'

I am quite well aware that these compound personal names have many defenders even among prominent scientists; it is argued that since personal genus-names are properly formed by the addition of the Latin suffixes *-a*, *-ia*, *-ella*, *-ina*, etc., there can be no objection to making these suffixes consist of an adjective or noun. But while the practice may not be technically incorrect, it is certainly not harmonious with the fundamental principles of etymology, and the results, whether we consider them from the standpoint of euphony or signification, are frequently ludicrous. Moreover, they often originate on account of an inordinate and misdirected desire to honor a collector with more than one generic dedication. This has become a common practice, although formerly it was held as a general principle that one genus, and one only, could be dedicated to a single individual; while in the case of species, it was customary to single out one striking new plant from the list and designate it in honor of the collector, other new species receiving descriptive names. But nowadays, if John Smith, let us say, visits some remote country and returns with a series of specimens containing several new genera and perhaps thirty new species, the botanist who determines his collection, finding a previously-published *Smithia*, establishes a '*Neosmithia*' and a '*Smithiophytum*,' perhaps also a '*Smithiocarpus*' or a '*Pseudosmithia*'; while among the new species we shall probably find a '*Smithii*' for each separate genus. The same traveler is likely to be similarly honored if he reaps an equally rich harvest in another locality the following year.

Another objectionable class of names belonging to the same general type are those derived from localities with the addition of the Latin suffix *-ensis*. Originally this was applied to names of States or countries already in the Latin form; and *Virginienensis*, *Carolinensis*, etc., are irreproachable. But then we began to have *Bostoniensis*, *Tennesseensis* and *Wyomingensis*; one writer has furnished us with '*Bajensis*,' from Baja, the Spanish name of a small Californian town; and within the last few months a distinguished German systematist, having occasion to describe a new *Selaginella* from a certain locality in Africa, has applied to it the graceful and flowing designation '*njam-njamensis*.'

Whatever may be one's individual views concerning combinations of English personal names with Latin suffixes, I am sure that very few defenders will be found for the other classes mentioned, of which '*graminoides*' and '*pseudocaudatum*' are types. To those whose classical vocabulary is limited, the pages of the Latin lexicon afford numerous suggestions for specific names irreproachable in form and pregnant with meaning; it seems strange that so large a proportion of our systematists regard the rules of etymology and grammar as of so little importance in plant naming. Glancing over the pages of one or two of our prominent serials, I noted the following examples of Latin and Greek hybrids, many of which are as clumsy in their lack of euphony as they are faulty in their construction: '*paucicephala*,' '*pauciphylla*,' '*curvicaarpus*,' '*cresenticarpus*,' '*cuspidocarpus*,' '*arenicoloides*,' and '*polyclavatum*.' I have not thought it worth while to discuss such specific names as '*annulum*' for *annulatum*; '*arenicolum*' for *arenicola*; and '*glabrissimum*' for *glaberrimum*, though these were actually published in all seriousness by authors of whom better work might have been expected.

In his review of De Candolle's 'Nouvelles Remarques sur la Nomenclature Botanique' Dr. Gray, in commenting upon the suppression of the fourth section of article 60 in the Paris Code, enjoining the rejection of names formed by the combination of two languages, observes: "Let us hope that we shall not be driven to the acceptance of the specific name 'acuticarpum' which one of our botanists has recently perpetrated." Whatever may be our views of nomenclature we must admit that in intellectual and philological attainments the botanists of the past generation are our superiors, and we cannot fail to award them respect and admiration for their vigorous efforts in behalf of the purity of scientific terminology. The list of recently published names above cited, on the other hand, may be accepted as evidence of what plant nomenclature in the twentieth century is coming to.

Having thus discussed at some length the various forms of false or otherwise objectionable plant names, with some slight indication of the historical practice in each case, we are led naturally to a consideration of the final question, what is to be done with these names? To my mind a serious discussion and an authoritative reply to this question are of vital importance at the present stage of botanical nomenclature in this country. We now have a working code, based on sound general principles and appealing in its practical operation to the spirit of law and order rather than to the fickle quality of individual judgment. Yet this code is absolutely silent upon the important question of correctness in plant naming. To be sure, it reaffirms the canons of the Paris code except where they conflict with its newly established principles. But the Paris Code is an instrument of considerable age, and, excellent as are most of its provisions, few botanists would now subscribe to all the Decandollean requirements. The modern tendency is to avoid interfer-

ence with any erroneously constructed terms unless the mistake is one of gender or orthography. The sentiment against altering false descriptive and false locality names like *Lunaria annua* and *Asclepias Syriaca* is even more strong; and this attitude seems reasonable, since these names are entirely correct in form, and the fact that they are untrue or anachronistic is frequently not the fault of the original author.

Objections, however, to the alteration of incorrectly constructed names like 'graminoides' are of little force in view of the position taken by many writers with regard to barbaric and other names not in the Latin or Greek form. I have already pointed out how certain Adansonian genera have been accepted without question while others of the same stamp are rejected. An attempt has been made to Latinize some of these by adding the termination *-a*; but the result is bastard Latin at best, and is far from the spirit of Adanson's original intention. Konig, for example, a word distinctly German in form, has been changed to Koniga! If by the mere Latinization of a name derived from some modern language it is to be considered legitimate, then why not take Gansblum of the same author and make it Gansblumia? The logical application of this theory would make it possible to adopt 'Washtubbia' and all of the other wonderful creations in the 'Nonsense Book of Botany.'

I am quite well aware that to retain in their present form the barbaric names of Necker and Adanson and the Aztec atrocities of ten or more syllables published by Hernandez in 1790 would be open to serious practical objection; but it is absolutely certain that all should stand or fall alike. *Sabal* has no more rights than *Rulac* or *Konig*; and if the Latin termination of *Bikukulla* entitles it to admission there is no shadow of an excuse for altering the *k*'s to

c's, as has been done in our recent manuals. If, on the other hand, we adhere to the view that a name, to be worthy of acceptance, must be in Latin form, we have no recourse but to abolish '*graminoides*,' '*polyclavatum*,' and the other hybrids, relegating them to the same limbo of obscurity with *Gansblum*, *Catjang*, *Rulac* and similar creations.

After uniformity in recognizing the rights of the doctrine of priority, the most important thing is to secure uniformity in our treatment of the names assured to us through the operation of that principle. It is true here, as in most other affairs, that the fewer exceptions we admit, the greater the practical benefit of the rule. At the present time our writers are serenely pursuing their individual preferences, correcting a name when they deem it advisable to do so, or even making substitutions of one name for another through one of the causes above discussed. It matters little whether we establish a rule of absolute permanency, retaining names in exactly the form in which they were first published, or whether we admit certain fixed exceptions; but the determination of a case should always be settled by authority and never left to personal caprice. No principle can be maintained if it is to be followed only at discretion.

One practical obstacle to any improvement of existing conditions is to be found in the tendency of the age itself. In this connection, let me quote a paragraph or two from the article by Professor Greene above referred to:

"It is easy to trace to its origin this condition of scanty mental equipment evinced by a great number of the botanical writers of to-day. Young men of the present are more than ever in haste to be earning wages and getting rich. It is a vulgar spirit which pervades—it is everywhere confessed—all classes of youth, as well as of older

people. Even they who aspire to what were once known as the learned professions, will hardly allow themselves the expenditure of time, not to say money, that is necessary to acquire anything beyond the most elementary and superficial education. * * * Nature study is captivating, perhaps much more so than grammatical, linguistic and metaphysical studies, to youth in general. There is no doubt of that. Neither need it be called in question that even a single branch of natural history study, long and ardently pursued, must have the effect of training a mind to careful and minute observation, and to reasoning and reflecting, and this is an important part of an education. But in our time few if any nature students are content with observing and thinking. All must write and print; and this whether they have or have not learned to write."

Against this somewhat discouraging state of affairs we are to set the tendency of the present time to recognize law as paramount and personal judgment as an uncertain guide. If botanists of all schools can be brought together in a strong and united effort to improve the literary and etymological side of nomenclature, it will not be difficult to secure agreement upon some sound general principle which will command the respect and win the adherence of every working scientist. There is here a subject upon which conservatives and radicals may unite, and a condition of affairs which cries aloud for attention and reform.

CHARLES LOUIS POLLARD.

U. S. NATIONAL MUSEUM.

THE USE OF HYDROCYANIC ACID GAS FOR EXTERMINATING HOUSEHOLD INSECTS.

WITH the growth of our population and the consequent crowding together of residences, the problem of the prevention and control of household insects is deserving of careful consideration from a sanitary stand-

point, but one that is usually overlooked. These pests are to be found in fewer or greater numbers of both species and individuals in every dwelling, office or storehouse, and no perfectly efficient means either to prevent their gaining an entrance, or to exterminate them when they are once established, has as yet been devised.

Recent successful applications of hydrocyanic acid gas for the extermination of insects infesting greenhouse plants have suggested the use of the same remedy for household pests. It is now no longer a theory, but an established fact, that .10 gram of 98-per-cent.-pure cyanide of potassium volatilized in a cubic foot of space will, if allowed to remain for a period of not less than three hours, kill all roaches and similar insects.

The experiments which led to this conclusion were made in a small building which is used for laboratory purposes by the Division of Botany. This structure has for some time been infested with several insect pests, the more numerous and troublesome being the common cockroach (*Periplaneta americana*). The building consists of one story and basement, the upper part being rather loosely built, as it is ceiled throughout with matched lumber. This method of construction provides numerous hiding places for the insects and also renders fumigation difficult, by permitting the gas to escape too quickly. Within the building are several sources of moisture, a rather high and constant temperature is maintained in some of the rooms, and large quantities of seeds and substances that serve as food for insects are stored, making conditions well adapted to the development of cockroaches.

During the early part of last year the roaches became so numerous as to be a detriment to the work of the laboratory and it was necessary to adopt some means of checking them. On the evening of May

10, 1900, the building was closed, and after opening up the interior of the rooms as much as possible the entire structure was fumigated experimentally with about .08 gram of 98-per-cent.-pure cyanide of potassium per cubic foot of space. The gas was allowed to remain during the night, or until it gradually escaped. When the rooms were entered the following morning there remained a perceptible odor of the gas, but this soon disappeared after opening the windows and doors. The ledges and window sills were strewn with dead houseflies and the floors bore abundant evidence of the effect of the gas on roaches. Not a single insect that showed indications of remaining life was to be found in the building. About a quart of the flies and roaches was gathered up and placed in a cage where they were allowed to remain until the following day, when two roaches showed signs of life by slow movements; these, however, could not walk when placed upon their feet and subsequently died.

For some time after this fumigation no roaches were to be found in the building, but eventually the eggs that had been previously deposited hatched and developed, adults were carried in from other buildings, etc., until in March of the present year the roaches had again become so numerous as to be a nuisance and a detriment to the work of the laboratory. The building was again treated with cyanide gas, this time at the rate of .10 gram per cubic foot of space, but was allowed to remain only fifty minutes, when the windows were opened and the gas permitted to escape. The roaches were strewn over the floors and several mice were found dead. A large number of the roaches were again collected and kept in a cage until the following day, when it was found that fully ten per cent. of them had not been killed and were as lively as before treatment; the mice, however, showed no

indications of life. The dose had been sufficiently strong, but had not been allowed to remain long enough to kill the more resistant of the roaches.

The third and most satisfactory experiment of the series was conducted on the evening of June 20, 1901, when an application of .10 gram per cubic foot was allowed to remain in the building over night. On the following morning the gas had not entirely escaped, and house-flies, centipedes, spiders, cockroaches, and mice were dead, with the exception of a few roaches that had secreted themselves between the sash and frame of a loosely fitting window and had thus secured enough pure air to prevent their being killed.

To convey an idea of the injury caused by the presence of large numbers of roaches in this laboratory it might be stated that frequently preceding this last fumigation, photographic plates placed on racks to dry and allowed to remain on a table for one hour were completely ruined by having the films eaten from the glass; packets of seeds stored in mouseproof tin boxes were so eaten as to allow the seeds to escape and in many cases the seeds themselves were destroyed. Since this fumigation no inconvenience has been caused by the work of roaches or mice.

By aid of the results obtained from the above experiments, together with our present knowledge of the action of hydrocyanic acid gas in exterminating greenhouse and scale insects, it may be stated that a dwelling, office, warehouse or any building may be economically cleared of all pests, provided that the local conditions will permit the use of this gas. It probably would be dangerous to fumigate a building where groceries, dried fruits, meats, or prepared food materials of any kind are stored. Air containing more than 25 per cent. of the gas is inflammable, therefore it would be well to put out all fire in an inclosure before fumigating. Hydrocyanic acid in all

its forms is one of the most violent poisons known and no neglect should attend its use. There is probably no sure remedy for its effects after it has once entered the blood of any of the higher animals. When cyanide of potassium is being used it should never be allowed to come in contact with the skin and even a slight odor of the gas should be avoided. Should the operator have any cut or break in the skin of the hands or face it should be carefully covered with court plaster to prevent the gas coming in contact with the flesh, or the possibility of a small particle of the solid compound getting into the cut, which would cause death by poisoning within a few minutes' time.

Hydrocyanic acid gas should not be used in closely built apartments with single walls between, as more or less of the gas will penetrate a brick wall. An inexperienced person should never use cyanide of potassium for any purpose, and if it be found practicable to treat buildings in general for the extermination of insects the work should be done only under the direction of competent officials. Our experiments have shown that a smaller dose and a shorter period of exposure are required to kill mice than for roaches and household insects generally, and it readily follows that the larger animals and human beings would be more quickly overcome than mice, since a smaller supply of pure air would be required to sustain life in mice, and small openings are more numerous than large ones.

The materials employed and the method of procedure are as follows: After ascertaining the cubic content of the inclosure, provide a glass or stoneware (not metal) vessel of two to four gallons capacity for each 5,000 cubic feet of space to be fumigated. Distribute the jars according to the space and run a smooth cord from each jar to a common point near an outside door where they may all be fastened; sup-

port the cord above the jar by means of the back of a chair or other convenient object in such a position that when the load of cyanide of potassium is attached it will hang directly over the center of the jar. Next weigh out upon a piece of soft paper 500 grams (about 17.1 ounces) of 98-per-cent.-pure cyanide of potassium, using a large pair of forceps for handling the lumps; wrap up and place in a paper bag and tie to the end of the cord over the jar. After the load for each jar has been similarly provided, it is well to test the working of the cords to see that they do not catch or bind. Then remove the jar a short distance from under the load of cyanide and place in it a little more than a quart of water, to which slowly add one and one-half pints of commercial sulphuric acid, stirring freely. The action of the acid will bring the temperature of the combination almost to the boiling point. Replace the jars beneath the bags of cyanide, spreading a large sheet of heavy paper on the floor to catch any acid that may possibly fly over the edge of the jar when the cyanide is dropped, or as a result of the violent chemical action which follows. Close all outside openings and open up the interior of the apartment as much as possible in order that the full strength of the gas may reach the hiding places of the insects. See that all entrances are locked or guarded on the outside to prevent persons entering, then leave the building, releasing the cords as you go. The gas will all be given off in a few minutes, and should remain in the building at least three hours.

When the sulphuric acid comes in contact with the cyanide of potassium the result is the formation of sulphate of potash, which remains in the jar, and the hydrocyanic acid is liberated and escapes into the air. The chemical action is so violent as to cause a sputtering, and frequently particles of the acid are thrown over the

sides of the jar; this may be prevented by supporting a sheet of stiff paper over the jar by means of a hole in the center through which the cord supporting the cyanide of potassium is passed, so that when the cord is released the paper will descend with the cyanide and remain at rest on the top of the jar, but will not prevent the easy descent of the cyanide into the acid. The weight of this paper will in no way interfere with the escape of the gas.

At the end of the time required for fumigation the windows and doors should be opened from the outside and the gas allowed to escape before any one enters the building. A general cleaning should follow, as the insects leave their hiding-places and, dying on the floors, are easily swept up and burned. The sulphate of potash remaining in the jars is poisonous and should be immediately buried and the jars themselves filled with earth or ashes. No food that has remained during fumigation should be used and thorough ventilation should be maintained for several hours. After one of our experiments it was noted that ice-water which had remained in a closed cooler had taken up the gas and had both the odor and taste of cyanide.

For dwellings one fumigation each year would be sufficient, but for storage houses it may be necessary to make an application every three or four months to keep them entirely free from insect pests. The cost of materials for one application is about fifty cents for each 5,000 cubic feet of space to be treated. The cyanide of potassium can be purchased at about thirty-five cents per pound, and the commercial sulphuric acid at about four cents per pound. The strength of the dose may be increased and the time of exposure somewhat shortened, but this increases the cost and does not do the work so thoroughly. In no case, however, should the dose exceed .22 gram or remain less than one hour.

The practical application of this method of controlling household insects and pests generally is to be found in checking the advance of great numbers of some particular insect, or in eradicating them where they have become thoroughly established. This method will be found very advantageous in clearing old buildings and ships of cockroaches.

W. R. BEATTIE.

DIVISION OF BOTANY,
U. S. DEPARTMENT OF AGRICULTURE.

*ENGINEERING EDUCATION IN LONDON.**

JUDGED merely by the magnitude and diversity of the work actually carried out within its boundaries, London is by far the most important center in the world for civil, mechanical and electrical engineering. Its vast population includes a larger number of engineering employers and engineering workmen of every grade and in almost every branch of work than any other city can show. The demand for engineering instruction of every type is large and steadily increasing. Yet the provision now existing for engineering instruction can only be described—if we compare it with the needs of London in this age of steel—as trivial. Out of six millions of inhabitants the total number of engineering students above matriculation standard is estimated at 600. What provision there is seems good, as far as it goes, but it is ludicrously below the requirements of London, alike in extent, comprehensiveness, and variety.

The engineering instruction at present available in London consists mainly of three separate 'schools'—the Central Technical College of the City and Guilds of London Institute, University College and King's College—of a high standard of excellence in the somewhat limited work that they undertake, with a small staff of first-rate professors, and good, though not very

extensive, equipment. Their main drawback is their limited size and scope, the high fees which they are compelled to charge, and their limitation to day students. Their work is, moreover, narrowly restricted by lack of space, lack of staff and lack of funds. They contain, in the aggregate, only about 350 students in all branches of engineering. Supplementing these three 'schools' (which are all situated in West Central London, within an area of three square miles) there are about a dozen less completely organized centers of engineering instruction, each with one or two professors and instructors of university rank, aided by subordinates dealing with the less advanced classes. These include the Finsbury Technical College of the City and Guilds of London Institute, where first-rate professors deal with junior students, and the several 'polytechnics,' dealing with all ages and classes of engineering pupils. These centers are conveniently distributed in the different parts of London; they provide both day and evening instruction, and their engineering departments are rapidly increasing in size and importance. Their equipment and workshop accommodation, so far as mechanical and electrical engineering is concerned, is usually good, though somewhat limited. Besides many hundreds of elementary students in various engineering subjects, they contain in the aggregate about 250 engineering students doing work of university standard. This work could easily be extended, by strengthening the staff and improving the equipment of the several institutions, to an almost indefinite extent.

If we turn now to different branches of engineering, it may be noted that (apart from the Royal Naval College at Greenwich, which is not open to the public) absolutely no provision exists in London for instruction in marine engineering and naval architecture. Though the Thames is still one of

* From the *London Times*.

the great shipbuilding ports, and this local industry, moreover, has lately shown encouraging signs of revival, no young man in the Thames shipbuilding yards or marine-engine works can get access to instruction in his profession.

For civil engineering some small provision exists of high quality. But the instruction is limited in scope, given almost entirely in the daytime, and barred to most students by high fees. The position of London, as the capital of a vast empire, the center of organization for important engineering enterprises all over the world, and itself the scene of great municipal and capitalistic works seems to call for a considerable extension in the scope and variety of instruction in civil engineering. In connection with this need may be specially mentioned the lack of any systematic instruction for the large and growing class of municipal engineers; the absence of any school of railway engineering, dealing, among other things, with permanent way construction; the need for specialized training in dock and harbor work, for which London is the natural center, and, indeed, the total lack of any adequate treatment of hydraulics (for which alone Cornell University has a fully-equipped and well-endowed department). Moreover, this is perhaps the place to notice that (beyond one or two courses of professional lectures) London has nothing in the nature of a school of architecture. It contains far more architects than any other city in the world, and annually adds a larger quota to the profession than any other center. But it leaves them to pick up their art in the old-fashioned way, and makes no organized attempt to provide modern instruction. The result is that, whether on the constructive or the artistic side, we lag far behind the United States, France and Germany.

The provision for electrical engineering,

though lately much increased, is still inadequate, both in extent and in variety. Above all, there is lacking any adequate opportunity for research and instruction in the more advanced and newer developments. How much of the future of industry may not turn on the proper working out of the possibilities of high-tension transmission and polyphase currents? Where, too, is our school of electric traction, which will enable us to keep, at any rate, some part of this rapidly-growing industry in our own hands? It is not to our credit that, though Great Britain supplies the original ideas, the greater part of the equipment of the 'tube' railways has to be made in the United States and Switzerland.

Dealing with the matter geographically, we may say that, if all the existing centers were enabled freely to expand to meet the growing demand, and brought up to a satisfactory standard of efficiency and comprehensiveness, the greater part of the six millions of population would, as far as mechanical and electrical engineering are concerned, be adequately served. There would, however, still remain in the outer suburbs such important centers of population as West Ham, Croydon, Willesden, and Tottenham, containing in the aggregate over three-quarters of a million people, or as many as all Glasgow, needing engineering schools; and even within the county area additional engineering schools are required in the neighborhood of Hammersmith, Hackney, and St. Pancras. If these were provided the number of engineering centers within the radius would be raised approximately from 15 to 20, and it may confidently be predicted that the number of engineering students above matriculation standard could be, within two or three years, certainly trebled (*i. e.*, raised from 600 to, including all departments, at least 2,000); and would then still be far behind the number for Belgium or Saxony, with

which kingdoms—not with any one city—London has to be compared.

What is wanted in the faculty of engineering is, therefore:

1. Increase in staff of professors and instructors at existing centers—say £10,000 a year (£330,000).

2. Extensions at existing centers in buildings and equipment to accommodate additional students—say £150,000.

3. New centers—building, equipment, and endowment of engineering departments at—say seven at £50,000 (£350,000).

4. New subjects—provision for buildings, equipment and endowment of centers for marine engineering and naval architecture (£100,000); civil and municipal engineering (£100,000); railway, dock and hydraulic engineering, etc. (£100,000); electric traction (£100,000); architecture (£100,000), etc. We may say, therefore, that the faculty of engineering needs a capital sum of £1,330,000.

SCIENTIFIC BOOKS.

Bibliotics, or the Study of Documents. By PER-SIFOR FRAZER. Third edition. Philadelphia, J. B. Lippincott Co. 1901. Pp. xxiv+266.

The subject-matter of this book, not very clearly suggested by the title, is the methods used by the handwriting expert and by the chemist, in the identification of writing and the detection of forgery. A scientific man desirous of getting some insight into these methods—or into the best of them—will find this book good reading. It is written with a scientific bent. It considers handwriting much as a zoologist considers animals. The determination of the characteristics of a given handwriting is like the determination of the characteristics of a natural species. The older methods relied on general impressions or on the description of salient features; the newer methods rely on measurement of the details. A person's handwriting, like a natural species, is a variable thing, and the exact study of it must deal in averages and ranges of variation. "It will be readily conceded that at least two factors are

present in the performance of an act which is often repeated. One is the general similarity, and the other is the variation in some details which prevents any two acts or results from ever being exactly identical. These are analogous to the two important factors of the theory of evolution, called, by Charles Darwin, hereditary transmission and accidental variation. In order to arrive at an ideal standard of similar recurrent actions, it is necessary to eliminate, as far as possible, the accidental variations. The most obvious way to do this is to take the average or mean of the records of a number of such actions." The first method devised by the author for arriving at the mean was the graphic method of composite photography. This appeals to the eye, and shows directly which parts of a signature are most uniform and which are most variable. A disputed signature may better be compared with a composite of several genuine signatures, than with any one of them.

The more exact method of averages, also devised by the author, begins with actual measurement of details; and it is the inconspicuous details that are most characteristic. The salient features can be changed more or less at the writer's will, or imitated by another person. But the little tricks of curvature and slant and proportions, the minutiae of shading and alignment, as they are the expression of unconscious habits, so they cannot voluntarily be laid aside, and as they are undetected by the eye, so they cannot be reproduced by a forger. The most useful details for measurement are angles and the ratios of different lengths; these are very inconspicuous, yet fairly constant, not changing with the size of the letters.

If, then, a signature is disputed, several genuine signatures are obtained, and a certain number of details are measured in all the specimens; the average measurements of the genuine signature are computed, and the measurements of the disputed signature compared with them. Close agreement throughout stamps the disputed signature as genuine; wide divergence as spurious. Some divergence is of course to be expected, and in fact complete identity is evidence of tracing. But just how much difference can be allowed? How sure is the expert of his decision? It does not appear that the theory

of probabilities has been used in any rigid way. The author's experience leads him to adopt a difference of 15% between the average and the disputed signature as ground for suspicion. Differences of 5 or even 10% are not uncommon in genuine specimens. But differences of 15% are uncommon, and, especially if repeated, are suspicious. The expert's decision must often rest on rather weak foundation as judged from a scientific standpoint, and the more so since he often has but half a dozen specimens from which to determine his average. The work of Mr. Frazer is very suggestive of what might be done in the study of handwriting. An extensive study of the variability of the individual, and of the differences between different individuals, as regards these ratios, angles, and other details, would show how sharply individualized they are, and furnish a scientific basis for the expert.

Another method of the author is the microscopic examination of the margins of the strokes. Under a magnification of 120 diameters, or even much less, a pen or pencil stroke is seen to have irregular edges; it is full of serrations of different sizes, the smaller superposed on the larger. There are usually more of them in one margin than in the other, depending on the position of the pen and other peculiarities of the writer. Whether they are completely individual, it would be premature to say, but they can at least be often used to distinguish between the writing of two persons. With the cooperation of Professor Witmer, the author has made micro-photographs and camera lucida tracings of these wavy margins, and inclines to regard some of them as records of the minute, normal tremor of the hands, produced by fluctuation in the nerve currents that control the muscles. Machine-ruled lines, though not free from irregular margins, showed fewer serrations than lines made by hand. The reviewer is much inclined to doubt this interpretation of the wavy margins, since he finds the serrations more marked on rough than on smooth paper, whereas the friction of the rough paper would tend to conceal the tremor. The rate, too, at which the serrations are produced is not approximately constant, as that of the tremor is, namely, at 8-15 pulses per second; a fast stroke and a slow show about

the same number of serrations per millimeter and those in the fast stroke must have been made, in one line measured, at about the rate of 480 per second. Many of the irregularities are probably due to the texture of the paper, and others to vibrations of the pen. Yet one's manner of holding the pen might give rise to characteristic forms of margin.

Still other chapters of the book treat of the chemical and physical tests for inks, of tests for erasure and other tampering, of tests for 'guided hands,' and of other problems incidental to the detection of forgery. There are several excellent plates.

R. S. WOODWORTH.

Taxidermy, Comprising the Skinning, Stuffing and Mounting of Birds, Mammals and Fish. With numerous engravings and diagrams. Edited by PAUL N. HASLUCK. London, Paris, New York and Melbourne, Cassell & Company. 1901. 16mo. Pp. 160.

Within the last ten years at least three admirable books on taxidermy have been brought out in the United States, and any new work on the subject should either bring forward some new and improved process of preserving animals, or at least present the most approved methods in a clear and detailed manner. The little book under consideration does neither; the methods described in its pages are the old ones, and not always the best of those, while the amount of space given to each group of animals is so limited that the descriptions are necessarily brief, while there is nothing whatever on the mounting of large mammals, although this is seldom acquired from books alone.

However, the book is intended for the amateur who wishes to preserve some trophy of the chase rather than for any one who really intends to master the art of taxidermy, and there are directions for making screens, polishing horns, tanning skins, and doing various bits of taxidermic fancy work. The small size of the book enables it to be readily put in the pocket, and, as it takes but little room, it might readily be carried to seashore or country on the chance that it might be desired to save some bird, mammal or fish, or make a pair of wings into a screen.

F. A. L.

La Democrazia nella Religione e nella Scienza-Studi sull'America. By ANGELO MOSSO. Milan. 12mo. Pp. 450.

This book is a striking proof of the remarkable versatility of Professor Mosso, the Italian physiologist. It purports to be a résumé of impressions gathered on his visit to this country in 1899, but the book has a wider bearing and goes quite beyond the scope of a journal of travel. It is a very suggestive survey of some of the most characteristic aspects of American life, and Professor Mosso, who was already known as a writer of unusual brilliancy and cleverness in his own field of physiology, shows here a decided taste for sociological investigations—a feature quite new in the personality of the author of 'La Paura.' He is too modest to consider himself anything but a dilettante in the study of social facts and problems. But the thoroughly scientific training of Mosso's mind, his experimental habits and trend of thought, his keen power of observation, raise the value of his sociological impromptu and give his studies of American life a deeper significance, which cannot fail to command the attention of the 'specialist' himself.

The book includes eleven chapters and, as an appendix, the lecture on 'Thought and Motion' delivered at Worcester, Mass., on July 7, 1899, on the 10th anniversary of the foundation of Clark University. The first chapter is mainly descriptive. It is a series of notes taken while travelling through the country. Mosso, who is a fine writer, shows here his characteristic qualities of vividness and brilliancy. The second is a study of the general features of the population. Here the physiologist has his way and shows himself at every step. The various aspects of the population, anthropological characters, mental and moral traits, the demotic composition, the birth-rate, the criminal and suicidal tendencies, etc., are all systematically taken up and discussed with great clearness and lucidity. Mosso is struck by the unmistakable evidence of nervous strain exhibited by the American population, as a whole. "Perhaps," he says (p. 38), "we have reached in this country the maximum limit of work that can be attained by the neuro-muscu-

lar system." Mosso is a firm believer in the influence of climate upon the race.

"The transformation of the anthropological characters under the influence of climate is," according to Mosso, "a physiological fact that cannot be doubted" (p. 75). Climate and education—meaning, of course, by the latter the action of social environment—are the only sources of dissimilarity in men (p. 106). This is the thought that runs through Chapter III., in which the racial question is taken up and discussed in the light of recent literature. Mosso does not believe in the form of the skull as being the differential element of racial types and an index of the psychical tendencies of each. "This is," as he puts it, "a puerile form of materialism. Our present knowledge of the structure and function of the nervous system does not warrant our attributing such a prominent importance to the form of the skull. The alleged measurements of the anthropologists are entirely worthless as a means of determining the psychical tendencies of a man or a nation" (p. 80). The difference in the form of the skull and in the color of the hair, upon which the entire structure of Ammon and Lapouge's anthropo-sociology is based, is due to the combined action of altitude and temperature—*i. e.*, to the climate. Inhabitants of the mountains have fair hair, while inhabitants of the plains have dark hair. Livi has conclusively shown that all over Italy—including Sicily and Sardinia, where the so-called northern races never reached—the mountains are inhabited by fair-haired men. Since the color of the hair is dependent upon the deposition therein of a varying amount of pigment ultimately derived from the blood, it is not difficult to trace the connection between the climate and the phenomena of oxidation which are at the bottom of the production of pigmentary matter. On the other hand, the dissimilarity in the form of the skull, upon which so much stress has been laid by anthropologists, is merely due to the lack of correlation between the size of the body, which is influenced by altitude and temperature, and the size of the brain, which is left unchanged (pp. 82–83). There are no races in the old metaphysical meaning of ethnic groups governed by congenitally blind impulses. The

differences among men are all traceable to the action of climate and education (p. 96). The Germans and the Scandinavians are, together with the Latins, the representatives of the same Mediterranean race, which, according to the most accepted view (Sergi, Ripley) was the primitive inhabitant of Europe. The so-called northern peoples are merely that part of the original racial stock that went north and became fair-haired, taller and dolicocephalic through the combined action of climate, social environment and natural selection (p. 97). This leads Mosso to refute the legend of Latin decline and to discard the assumption that there exists a congenitally organic difference between the Americans—as representing the northern races—and southern or Latin races.

While we agree with Mosso in his refutation of the fantastic theories of Ammon and Lapouge, we cannot leave unchallenged a statement made at the very beginning of this interesting chapter. Mosso says (p. 79) that “a physiologist cannot possibly admit the existence of differences among white men in regard to the aptitudes of the nervous system. Sociologists,” he says, “are largely responsible for the widespread belief that the causes of historical facts should be traced to different impulses originating from an alleged structural dissimilarity of the nervous system.” Without admitting the skull theory and all the nonsense connected with it, we cannot deny the existence of two mental types, a motor and a sensory, to which correspond, on the volitional side, the impulsive and the obstructed, as masterfully described by James. Now, these mental types cannot but be the outcome of some peculiarity in the ultimate structure of the nervous system. There must be some deep physiological condition to account for the fact that in one set of brains we have a quicker discharge into the muscles than in another set where we have a distinct damming up of the nervous impulse. We are as yet unable to determine what this deep-seated peculiarity is. Probably we have to deal with a chemical problem, and the difference between the two classes of brains in question is in some way related to the metabolism of the nervous element. The fact, however, is undeniable and Mosso, as a physiologist, cannot possibly think

that these two mental types have no physiological substratum. Space forbids an exhaustive discussion of this interesting topic, but we must say that the unequal distribution of these two types of brains within a definite social group is probably the fact which affords the most conclusive explanation of the so-called racial differences. According to the predominance of one or the other of those two mental types, within the group, we have a different mental tone in the community and these various shades of mentality are, after all, the very essence of racial dissimilarity.

In the next chapter—the fourth—Mosso takes up the problem of Democracy and Religion. He is struck by the wonderful growth of Catholicism in this country, a fact which is in harmony with the expansion of Catholicism in Europe, and especially in England, within the last fifty years. Seeking an explanation, Mosso remarks that religion is necessary only for the mentally weak—*i. e.*, for the masses. A nation of philosophers might do without it, just as the intellectual élite does. But no religion can help those who believe better than Catholicism because this latter appeals more vividly to the emotional element, which is the very essence of belief (p. 128). Protestantism is, like the northern climates, gray and sad. There is an element of dullness in it which is in striking contrast with the warmth and life of Catholicism, and since religions have always been, as Mosso vigorously puts it, ‘a form of festival’ (*una forma di festa*) it is the one that appeals more vividly to the senses which has the greater power of propagation (p. 129).

On the other hand, civilization makes men more exquisitely excitable. This ‘effeminating’ influence of civilization is also at work in the expansion of Catholicism (p. 128). The tendency to mysticism which is quite evident in art and literature is a result of the increased intensity of excitability brought about by the refining influence of civilization. And mysticism is fatal both to science and to Protestantism. The clearness of Mosso’s position is somewhat obscured by the fact that he refers to Catholicism as being both the religion of the ignorant masses and the religion of the hypercultivated mystical. Now, Catholicism can be

one or the other of these two things, but cannot be both at the same time. Perhaps the latter interpretation is the nearest to truth. The expansion of Catholicism in England within the last fifty years is evidently related to the undercurrent of mystical tendencies which has been pushing Saxon art towards archaic forms. But, as far as this country is concerned, the growth of Catholicism is dependent upon increase in immigration from Catholic countries, a factor which has been somewhat underestimated by Mosso.

In the following chapters—V., 'The Weakness of Religious Feeling,' VI., 'The Protestant Universities,' VII., 'The Catholic Universities and Canada,' VIII., 'Americanism,' IX., 'Modern Tendencies in Education'—Mosso takes up the different aspects of the problem upon which his interest is mainly centered, *i. e.*, the problem of the relation that democracy bears to religion and education. Particularly worthy of mention are the chapter on 'Americanism,' which gives a very clear account of the controversy waged between the Roman Curia and some prominent representatives of Catholicism in this country, and those in which he describes the peculiarities of American university life. Chapter X.—'The Crowd and the New Aristocracy'—is a study of American political life as influenced by the formation of a powerful aristocracy of millionaires. The tenth chapter, on 'Primitive America,' is a hymn to nature. It is a vigorous description of some of the most picturesque aspects of this continent, in its wildest regions, where civilization has not yet spoiled the divine charm of an enchanting nature. Here Mosso shows his decided literary tastes, and some of his pages are really beautiful.

On the whole, Mosso's book will prove both interesting and instructive to his own compatriots as throwing a fuller light upon this wonderfully growing country, which is called to play such a tremendous rôle in the drama of the century. While to the American reader who can afford to take hold of this charming book, it will undoubtedly be a source of deep gratification to see how the noble efforts of this valiant race towards a high ideal of civilization are appreciated by a scholar and a scientist of Mosso's standing and fame.

GUSTAVO TOSTI.

Atoms and Energies. By D. A. MURRAY, with an introduction by PROFESSOR FREDERICK STARR, of the University of Chicago. New York, A. S. Barnes & Co. 1901.

"It is a long time since I have read a work in physical science which has given me so much pleasure as 'Atoms and Energies.' The subject is interesting, the point of view novel, the argument clear, the book itself satisfactory."—Professor Starr.

In writing this short review our chief aim is to make reply to Professor Starr, for we too have been trying to interest him and others not specially devoted to the subject in physical science.

From the contents of the little book before us it appears that the author knows nothing of the works of the great builders of that marvelous Engine of Interpretation, the atomic theory. Among these works may be mentioned the following, each of which is monumental in character. The list will serve to indicate to the reader the present scope of the atomic theory. Maxwell's and Boltzmann's contributions to the 'Kinetic Theory of Gases,' Sohncke's 'Theory of Crystal Structure,' Poisson's contributions to the 'Molecular Theory of Elasticity,' van't Hoff's 'Stereo-chemistry,' Planck's 'Electro-atomic Theory of Radiation,' and J. J. Thomson's 'Corpuscular Theory of the Electric Discharge,' to say nothing of such works as Johnstone Stoney's on 'The Electron Theory,' and Lord Kelvin's on 'The Vortex-atom Theory,' both of which are devoted to 'many an assumption that is not exactly necessary,' to use Helmholtz's words, which are quoted in the next paragraph.

What are atoms? we are inclined to ask when we take up Mr. Murray's book, although under ordinary circumstances the question does not much concern us. In so far as we have anything to do with them we believe they are mere logical constructions. Bacon long ago listed in his quaint way the things which seemed to him needful for the Advancement of Learning. Among other things he mentioned 'A New Engine or a help to the mind as a tool is a help to the hand,' and the greatest achievement of the nineteenth century in physical science is the realization of Bacon's idea, in a great body of useful theory. As Helmholtz

says: "It is a great advantage for the sure understanding of abstractions if one seeks to make of them the most concrete picture possible, even when the doing so brings in many an assumption that is not exactly necessary." Just how much of this useful theory is to become the common property of all men it is impossible to say. For one thing, the theory is not by any means fixed and may not be for a century to come, and no one but the most determined specialist can be expected to appropriate and use the more complex theories which depend upon the keenest mechanical sense, the sharpest algebraic faculty, the strongest geometrical imagination and the most devoted study; but there is a great and growing body of simple conception and theory which can and does represent to the understanding a vast array of fact. Every one should know that the physicist's idea of a thing such as a gas, an electric current, or a beam of light comes very near to being a working model of the thing. The elements out of which such models are made are purely notional, and although the physicist habitually speaks of them in objective terms for the sake of concreteness and clearness, it is of the utmost importance that the thought be chiefly directed to the physical facts which are represented and not to the models themselves. Thus the chemist may speak of the tetrahedral carbon molecule with assymetrically attached molecular groups, while the thought is directed chiefly to those remarkable physical properties of sugar and tartaric acid which are intended to be represented.

There is a tendency among reflecting men to confuse the boundaries between our logical constructions and the objective realms which they represent to the understanding. In fact, Münsterberg maintains that this confusion is the gravest danger of our time. It seems to us that these logical constructions constitute the noxious gases mentioned by Professor Woodrow Wilson as escaping from our laboratories, and that they become noxious by confusion and misuse. The old idolatry is the worship of external form—imagine a remote ancestor worship fully contemplating the newly invented club instead of using it—and the new is the con-

templation of our logical constructions in an aspect in which they are not real, a vaporous idolatry which is frightfully prevalent.

We are impressed more and more every day with the fact that the most satisfactory specialist to talk with is the biologist. His knowledge is not represented to his mind by means of that mathematical-mechanical system of conceptions which is the basis of all our knowledge in physical science, but it approaches art in its close association with external form. Conversation with a physicist, however, is very like looking into the mechanism of a Mergenthaler type-casting machine with the machine out of sight, feasible enough among designers and builders, but scarcely a satisfactory basis for the flow of thought when one party in the conversation happens to be unfamiliar with and perhaps not interested in the mechanism in question. Nevertheless a seriously minded physicist cannot help feeling mortified when he sees a colleague of Professor Starr's standing examining a more or less fanciful, inoperative, and obsolete pea-shooter with the pleasurable conviction that he is unraveling the intricacies of a complicated mechanism of the latest and most approved construction.

W. S. FRANKLIN.

SCIENTIFIC JOURNALS AND ARTICLES.

The American Anthropologist for April-June, which has just reached us, contains the following articles:

'The Owakülti Altar at Sichomovi Pueblo': J. WALTER FEWKES.

'Chalchihuitl in Ancient Mexico': ZELIA NUTTALL.

'Notes on the Alsea Indians of Oregon': LIVINGSTON FARRAND.

'Kootenay Group-drawings': ALEXANDER F. CHAMBERLAIN.

'Ethnology in the Jesuit Relations': JOSEPH D. MCGUIRE.

'Rare Books relating to the American Indians': AINSWORTH R. SPOFFORD.

'Summary of the Archeology of Saginaw Valley, Michigan': HARLAN I. SMITH.

'Mummification, especially of the Brain': D. S. LAMB.

'Decorative Symbolism of the Arapaho' (with plates V. and VI.): A. L. KROEBER.

'Initiation Ceremonies of the Wiradjuri Tribes': R. H. MATHEWS.

'The Development of Illumination': WALTER HOUGH.

THE contents of the *American Journal of Science* for August are:

'Experiments on High Electrical Resistance,' Part II.: O. N. ROOD.

'Mineralogical Notes': A. J. MOSES.

'Motion of Compressible Fluids': J. W. DAVIS.

'Action of Sodium Thiosulphate on Solutions of Metallic Salts at High Temperatures and Pressures': J. T. NORTON, JR.

'Secondary Undulations shown by Recording Tide-gauges': A. W. DUFF.

'Mathematical Notes to Rival Theories of Cosmogony': O. FISHER.

'Studies of Eocene Mammalia in the Marsh Collection, Peabody Museum': J. L. WORTMAN.

'Electromagnetic Effects of Moving Charged Spheres': E. P. ADAMS.

'The Nadir of Temperature and Allied Problems': J. DEWAR.

The *American Geologist* for July contains a 'Sketch of the Life and Work of Augustus Wing,' by Henry M. Seeley. In this article the work of Mr. Wing, the teacher and preacher, in solving the early problems in New England geology is set forth. A portrait accompanies the article. 'Beach Structures in the Medina Sandstone,' is discussed by Professor H. L. Fairchild. The Medina sandstone is described as shallow water deposits, following the conclusions of Dr. James Hall and controverting the theory of Dr. Gilbert, who recently maintained that certain structures in said sandstone are giant ripples formed in deep ocean. The writer compares the structures in question to the beach formations on Lake Ontario at the present time. The article is accompanied by five plates from photographs. 'The Michipicoten Huronian Area,' by S. B. Wilmott, describes an area north of Lake Superior. It is accompanied by a geological map of the region. Mr. Oscar H. Hershey discusses 'The Age of the Kansas Drift Sheet,' and gives reasons why the Kansas drift as well as others of the lower Mississippi is a very old one. 'The Georgia Bauxite Deposits: Their Chemical Constitution and Genesis,' by Thomas L. Watson, is accompanied by a plate showing the distribution of

that mineral in Georgia. 'The Age of the Kansas-Oklahoma Redbeds' is discussed by J. W. Beede. The author put the deposits in question in the Permian. This paper is followed by 'A Short Discussion of the Origin of the Coal Measure Fire Clays,' by T. C. Hopkins, and the usual Comments and Reviews.

SOCIETIES AND ACADEMIES.

SECTION H. ANTHROPOLOGY. TITLES FOR PRESENTATION AT THE DENVER MEETING.

'Sculptured Stone Images of Man by the Aborigines in Nicaragua': J. CRAWFORD.

(1) 'The Stanley McCormick Hopi Expedition of 1901'; (2) 'The Sacred Bundle of the Osage'; (3) 'Games of the Pawnees'; (4) 'Hand or Guessing Games of the Wichitas': GEORGE A. DORSEY.

'Influences of Racial Characteristics on Socialization': FRANK W. BLACKMAN.

'Exhibit of curves of speech': E. W. SCRIPTURE.

'The Physical Characters of the Various Pueblo Indians, including the Mokis and Zuñis': ALES HRDLICKA.

'Current Questions in Anthropology': W J MCGEE.

'A Plea for Greater Accuracy and Greater Simplicity in the Writings of the Future regarding the American Aborigines': CHARLES E. SLOCUM.

(1) 'The Teaching of Anthropology in the United States'; (2) 'The Anthropological Collections of Yale University Museum'; (3) 'Twenty Years of Section H'; (4) 'The Sherman Anthropological Collection, recently purchased by the Scientific Society of Holyoke, Mass': GEORGE GRANT MACCURDY.

QUOTATIONS.

PRIORITY IN THE DISCOVERY OF THE MALARIAL PARASITE.

AN unfortunate controversy having arisen on the question of priority in the proof of the mosquito theory of the transference of malarial infection, Major Ronald Ross has published some correspondence on the subject which shows that the claims of some of the Italian observers cannot be substantiated ('Letters from Rome on the New Discoveries in Malaria,' 1900). These eight letters were written by Dr. Edmonston Charles, a resident in Rome, to Major Ross, then in India, and date from November 4, 1898, to January 14, 1899; a letter from Dr. Daniels is included, and they are preceded by a critical

introduction, and terminate with a postscript and bibliography by Ross. At this period the Italians, notably Grassi, Bignami and Bastianelli, were endeavoring to follow Ross's investigations on the développement of the malarial parasites in the mosquito, and Dr. Charles acted as an intermediary, informing Ross of the progress made by the Italians, and similarly communicating to the latter Ross's observations and handing them his specimens. In the first letter, Charles asks for specimens for Marchiafava 'of the mosquito in which human malaria develops.' Grassi now denies that Ross ever detected this species. It is pointed out how closely the Italians followed and how well informed they were of the details of Ross's work, yet now Grassi states that his labors were independent of Ross. In the third letter, with regard to the cultivation of crescents in the 'dappled winged mosquito' by Ross, Charles says, "He (Grassi) seemed perfectly satisfied that your description referred to the *Anopheles claviger*." Grassi now contends that he could not identify the malaria-bearing mosquito from Ross's description. Bignami, Grassi and Bastianelli have frequently stated that Ross's first successful experiments with human malaria were unsound, because the insects employed might have already bitten another animal before having been fed on man. Yet in Ross's publication it is clearly premised that the insects had been bred in bottles from the larvæ.—*Nature*.

IMPRESSIONS OF A GERMAN CONGRESS.

AN occasional correspondent, who speaks from experience, has been moved to unburden his soul as to the mode in which discussions are carried on at some German scientific congresses. The picture he draws is not, he declares, exaggerated, but his remarks must be understood as applying only to those congresses which are not divided into sections but in which the discussions take place in plenary session. There is a large room where the congress is to take place, filled with hundreds of our colleagues, of German and other nationalities. These gentlemen are prepared for several days' ennui, but are also resolved not to let it be all dull. They present a very varied ap-

pearance, and produce a very varied impression by the complexity of sound which their conversation, before the commencement of the proceedings, creates. The management consists of a chairman, who is changed at each sitting, and his *confrères*, the president, the secretary, and the other members of the council. The chairman opens the day's proceedings by informing the readers of papers that the time limit, namely, half of an hour for papers, and ten minutes for discussion speeches, will be rigidly adhered to. At first all goes smoothly until a speaker has occupied the attention of the House for twenty minutes or so, when there is heard an ever-increasing buzz of conversation from the back part of the room. Of this the speaker takes no heed, and when the half-hour is past, the chairman merely stretches himself and remains quiet. The next speaker has obviously not been fortunate in the impression that he has made on the House, for the conversation, begun during the last speech, continues, and becomes disturbing. But he, being accustomed to such trivial inconveniences, labors on steadily. The hands of the clock steal slowly onward, and when they register that the speaker has been standing at the desk for nearly twenty minutes, a single cry of 'End!' (*Schluss*) is heard. Soon the air is rent with wild delighted cries of 'End!' and feebly tempered by a few subdued remonstrating '*Gsch.*' The chairman rings his bell. Some order is restored, and he tells the speaker that he has two minutes more. Poor speaker! He has lost the thread of his argument (for papers must be given from memory, not read), he is face to face with the fact that he has but two minutes more to live—as a speaker—and he thereupon invariably pitches himself headlong into his subject, at such an enormous rate, and with so much energy, that it becomes a matter of impossibility to understand what he is speaking of. The noise at the far end of the room continues, and in one minute the second 'sound' of the bell is heard. The chairman now shows his humanity and asks the House to decide whether the speaker shall continue or not. This is done either by direct appeal and an interpretation of the responsive sound, as to what the

wish of the majority is, or by a show of hands. There is a subtlety in the decision, for if the chairman wishes he can rule on a single show, or he may ask for 'Ayes' and 'Noes,' or he may compare the number of hands shown with the number of persons present. But it is decreed that our friend, the speaker, must stand down, and there is something pathetic in his self-conscious, proud and satisfied bow, and the death-like silence which follows it for one moment. A discussion now takes place. At first absolute oblivion of time seems to surround the Chair, and the first intimation which the occupant of it receives of the fact that one member has occupied the platform for nearly half an hour is that his conversation with a colleague is interrupted by a dozen eager members who wish to have their say. Then he rings the bell and asks if the speaker has much more to say, but to do this he waits until the latter has reached the middle of a sentence. 'I am just finishing,' is the reply. Five minutes later a further ring, the same question, the same reply. Still five minutes later the chairman says that Herr X. is in possession of the platform, and requests the loquacious one to stand down. He forgets to bow, and, collecting his notes and papers slowly mumbles that he has had no time to give his most important points of argument. Will he try to continue his arguments at next year's congress?—*British Medical Journal*.

CURRENT NOTES ON PHYSIOGRAPHY.

THE MARYLAND COASTAL PLAIN.

A LUMINOUS generalization concerning the geological history and the geographical features of our Atlantic coastal plain has lately been announced by Shattuck ('The Pleistocene Problem of the North Atlantic Coastal Plain,' Johns Hopkins Univ. Circulars, No. 152, 1901). Five shore lines with wave-cut and wave-built terraces, accompanied by spits, bars and lagoon deposits, are recognized. The uppermost is the Lafayette on the margin of the Piedmont uplands at altitudes of from 300 to 500 feet. The lowest is on the present coast. The development of each shore line was preceded by a period of erosion during a somewhat higher stand of the land; hence when submergence to

the new level occurred, the shore was of irregular outline. Valleys were thus repeatedly drowned, and rivers transformed into estuaries; for one may trace the younger terraces along the sides of the older valleys. The changes of level do not seem to have been accompanied by so much warping as has been inferred by other observers: the conclusions thus announced are thought to be applicable to the coastal plain for some distance northeast and southwest of Maryland. A fuller description of the topographic details on which these changes are based will be waited for with interest.

DUNMAIL RAISE.

THE low pass between Windermere and Keswick in the English Lake district, annually crossed by thousands of tourists in stage and on foot, is known as Dunmail Raise. Its elevation is 782 feet, between Helvellyn, 3,118, and Scafell pikes, 3,210. R. D. Oldham ('On the Origin of Dunmail Raise, Lake District,' *Quart. Journ. Geol. Soc.*, LVII., 1901, 189-195) points out the striking disproportion between the size of the local streams and the dimensions of the opposing valleys that head in the open pass, and concludes that it is the work of a large river which once flowed from north to south through the mountains, long maintaining its course in spite of their upheaval, until at last overcome by a too rapid warping. While the conditions of such an origin are readily conceived, the consequences by which the conditions may be tested are not explicitly stated, and the reality of the postulated river is left in doubt. The present form of the opposing valleys being held to be beyond production by the existing streams, the valleys are taken as the product of the extinct river. The valleys being still but little modified by their streams, the warping by which the river was broken in two must have been relatively recent. The slopes of the opposing valley floors being strong and of recent origin, the warping that produced the slopes must have been rapid. As the present north-sloping valley descends against the slope of the extinct river for ten miles or more, the warping must have affected the district for a number of miles north of the pass. So rapid and extensive a warping can hardly have been

limited to the valley of only one river; its effects should be visible in all the neighboring valleys of the lake district, and until these effects are carefully deduced and systematically searched for, it seems safer to regard the erosion of the pass by a recently extinct river not as a probable conclusion, but only as an open suggestion.

A possible origin of the pass by glacial erosion in a preglacial notch of less depth is considered by Oldham and dismissed, because traces of glaciation were not found at a sufficient height; but on the latter point other observers do not agree, some maintaining the occurrence of an extensive local glaciation before the minor glaciation referred to by Oldham. Hanging valleys are not rare in these mountains ("We find in the Lake district a number of tributary valleys occurring in the hearts of the ridges, and opening out far above the bottoms of the main valleys, discharging their waters down the slopes in cascades." Marr, 'Scientific Study of Scenery,' 136), and one of them may be seen opening in the mountain side on the east just north of Dunmail summit. Glacial erosion as well as river erosion may, therefore, still deserve consideration in discussions as to the origin of the pass.

BRITTANY.

ONE of the excursions of the International Geological Congress held at Paris a year ago was led through Brittany by Barrois. An interesting account of it has been prepared by H. Credner under the title of its ancient name ('Armorika,' *Geogr. Zeitschr.*, VII., 1901, 21 p.). In contrast to the great deformation of the ancient rocks, moderate reliefs prevail to-day, much of the surface being nearly level to the eye for long distances. The region is peneplain, with occasional ridges and uplands maintained by the stronger rocks, but even there the forms are well subdued. The plain is usually clothed with a deep soil. It is here and there incised by narrow, steep-sided valleys, on whose walls the firm rock is exposed. The uplift of the peneplain, whereby the incision of young valleys has been permitted, is not explicitly stated, and the assertion that 'the valleys are extraordinarily old' is liable to misunderstand-

ing, until the reader infers that it is the predecessors of the present valleys that must be meant. The coast is generally marked by cliffs, torn into a ragged outline by a violent sea. The destructive work of the waves has been aided by a submergence of the land, of which there is not only geographical evidence in the form of bays and drowned valleys, but historical also, in the form of the ruins of a submerged town, of Roman roads that lead into the sea, and of megalithic monuments visible only at extreme low tide. The separation of England from France is ascribed to this submergence as well as to marine abrasion.

W. M. DAVIS.

A NEW ARCHEOLOGICAL PUBLICATION.

COMMENCING about September 1, the Archeological Section of the Wisconsin Natural History Society will publish, at regular intervals, a little 6- or 8-page sheet to be devoted to the cause of Wisconsin archeology. By this means it is hoped to keep alive and further the interest of the students, educators and collectors of Wisconsin in bringing about a better state of affairs as regards the preservation of the prehistoric monuments of the State.

The as yet uninterested attitude of the legislators argues that, for a year or two, at least, no bill favoring a State survey can be introduced. It is best, at present, to band together all persons interested until the time for action shall arrive so that the project can be carried to a successful issue.

The Bulletin is to be the organ of the campaign for a State archeological survey. It will not trespass upon the field of the journals now being published and which, being of too high price for the majority of State collectors and of a nature technically beyond their training, are not available for this purpose. It is intended to publish articles of local interest, short, general articles intended to train the average student, editorials favoring the free study and preservation of antiquities, notes, contributions of state collectors and students, notices of books bearing upon Wisconsin archeology, and all matter which will make the Bulletin of particular value to the archeologist of Wisconsin.

Dr. Charles E. Brown, of the Milwaukee Public Museum, is acting editor of the Bulletin, which will be known as the *Wisconsin Archaeologist*.

HARLAN I. SMITH.

GOVERNMENT RAILWAYS IN EUROPE.

DR. A. VON DER LEYEN, a railroad expert, has published an article in the June number of the *German Review*, concerning the management of the government railroads of Prussia, of which Consul General Günther sends an abstract to the Department of State.

He demonstrates that the example of Prussia in buying the private railroads and running them on government account has contributed to popularize this system in other countries, and states that not only have the other German states followed it, but that almost all the other European countries have purchased the existing railroads.

The Austrian government railroad net has to-day a mileage of almost 6,300 miles; that of Hungary, about 8,150 miles. Since 1882 a great change has taken place in Russia; of the then existing 14,000 miles of railroad, only about 40 miles were owned by the government. The total mileage in 1897 was about 24,300 miles, of which 15,780 miles belonged to the government. To this must be added the government railroads in Finland and Asiatic Russia, the Trans-Caspian and the Siberian railroads. The Servian, Roumanian and Bulgarian railroads are owned exclusively by the respective governments. Of the northern European kingdoms, Denmark has a government railroad system of 1,167 miles and 525 miles of private railroads. Norway's railroads belong almost exclusively to the government. Sweden has 2,303 miles of government and 4,387 miles of private railroads. The government has not yet succeeded in acquiring the latter, although efforts have been made to do so. Belgium, in 1898, through the purchase of the Grand Central Belge and some minor private roads, became the possessor of the whole Belgium railroad system. Holland acquired all the remaining private railroads in 1890; they are, however, operated by two private companies. The Italian Government purchased all

private main railroads of Italy in 1885 and leased them for twenty years to private corporations. Mr. von der Leyen states that both the last countries have had unpleasant experiences with this arrangement. Switzerland, after long discussion, resolved by federal law in October, 1897, to gradually purchase all the private railroads. On January 1, 1901, the first federal railroads were operated by the Government. By agreements of 1883, the six large French private railroads had their rights recognized by the Government, and no change has been made in the policy in that country. The relatively small Government railroad system, located between the Orleans and the Western railroads, has remained intact. As the private railroads, however, have received large subsidies from the Government, and as they will revert to the State in the second half of the present century, they can hardly be considered purely private railroads. Of the countries which have a private railroad system exclusively, only England and the United States remain.

SCIENTIFIC NOTES AND NEWS.

THE fiftieth annual meeting of the American Association for the Advancement of Science, as all the readers of this Journal are doubtless aware, opens with a meeting of the council, at three o'clock on the afternoon of Saturday, August 24. The first general session of the Association, however, begins at ten o'clock on the following Monday, when Professor Woodward, the retiring president, will introduce the president-elect, Professor Minot. Addresses of welcome will be made by the Hon. J. B. Orman, Governor of Colorado, and Hon. R. R. Wright, Jr., Mayor of Denver. Honorary President, J. B. Grant, will introduce General Irving Hale and Aaron Gove, who will welcome the Association on behalf of the business men of Denver and the educators of Colorado. To these addresses President Minot will reply. After announcements have been made by the secretaries, the general session will adjourn and the sections will be organized. The addresses of the vice-presidents are delivered in the afternoon, and the retiring president will give his address entitled 'The Progress of Science' on Tuesday evening. The Sections of

the Association and the nine societies affiliated with it will hold their regular sessions on Tuesday, Wednesday, Thursday and Friday. The general committee will meet on Thursday evening for the election of officers and agreement on time and place for the next meeting.

Two of the prizes created by the will of Alfred Noble will be awarded to Dr. Niels R. Finsen, of Denmark, for discovering the light treatment for lupus, and to Professor I. P. Pavlov, the Russian physiologist, for his researches in nutrition.

Nature quotes from a London daily the statement that Professors Haeckel, Conrad and Fraas, of Jena, Halle and Stuttgart Universities respectively, announce that the sum of 1,500*l.* has been placed at their disposal as a prize for the best work on the question, "What do we learn from the principles of the theory of heredity in reference to the inner political development and legislation of States?" Manuscripts must be in German and sent not later than December 1, 1902, to Professor E. Haeckel, Jena.

THE University of Glasgow has appointed John Ferguson, professor of chemistry, F. O. Bowers, professor of botany, and R. M. Wenley, formerly of the University of Glasgow and now professor of philosophy at the University of Michigan, as representatives at the bi-centennial celebrations of Yale University.

E. R. BUCKLEY, assistant superintendent of the Wisconsin Geological and Natural History Society and instructor of commercial geography in the University of Wisconsin, has been appointed State geologist of Missouri.

THE Baly Gold Medal of Royal College of Physicians of London for special distinction in the science of physiology has been awarded to Dr. F. W. Pavy, F.R.S.

PROFESSOR A. C. HADDON expects to retire from the chair of zoology at the Royal College of Science, Ireland, in order to devote himself more exclusively to anthropological work.

DR. ERNST MACH, professor of philosophy in the University of Vienna, has been compelled by ill health to retire from the active duties of his professorship.

PROFESSOR E. HAECKEL, of Jena, has made public the announcement that owing to the state of his health, his advanced age and pressure of work, he will not in future make any public addresses or attend any scientific congresses.

PROFESSOR ED. SUESS, the eminent geologist, gave on July 13 a formal lecture to his present and former students on the occasion of his retirement from the chair of geology. He has reached his seventieth year and his forty-fourth year as a university teacher. A scholarship has been established in the University at Vienna in his honor.

IN honor of the sixtieth birthday of Dr. A. Kirchhof, of the University of Halle, and at the same time of his twenty-fifth year of service to the university, a fund amounting to 12,500 Marks has been collected for the furtherance of geographical research.

THE Saxon Academy of Sciences at Leipzig has elected to membership Dr. Arthur von Oettingen, honorary professor of physics at Leipzig, and Dr. E. Ernst Abbe, honorary professor of meteorology and astronomy at Halle.

PROFESSOR A. R. CROOK, who holds the chair of mineralogy and petrography at Northwestern University, is at present engaged in explorations in Mexico. He is intending to ascend Mount Orizaba.

DR. CHARLES E. BROWN, of the Milwaukee Public Museum, is continuing his studies, begun several years ago, in the department of anthropology of the Field Columbian Museum, Chicago.

THE town of Amalfi has arranged to have this month a celebration in honor of Flavio Gioja, who lived in that city six hundred years ago, and is supposed to have invented or improved the compass.

A MEDALLION of Charles Hermite, the great mathematician, who died this year, will be placed in the Court of Honor of the Sorbonne.

WE learn from the *British Medical Journal* that a portrait of Dr. Thomas Young, from the painting by Sir Thomas Lawrence, has been placed in the Victoria Hall, Milverton, Somerset, with the following inscription: "Thomas

Young, M.D., F.R.S., etc. Born at Milverton, 1773. Died 1829. Physician, Natural Philosopher, and Master of many languages; he first established the undulatory theory of light, and translated the Rosetta Stone, which is the key to our understanding the Egyptian hieroglyphics."

DR. ADOLF ERIK NORDENSKJÖLD, the well-known arctic explorer and naturalist, died on August 13, in his sixty-ninth year. He first visited Spitzbergen in 1858 and again in 1861, 1864 and 1868, and visited Greenland in 1870 and 1875. In 1878-79 he made his famous voyage in the *Vega* through the northeast passage. He was professor in the Royal Museum of Natural History at Stockholm.

THE deaths are announced at the age of 55 years of Dr. W. Schur, professor of astronomy at Göttingen, and of Dr. E. Rehnisch, professor of philosophy at the same university, at the age of 62 years.

M. CASIMAR DE CANDOLLE was elected honorary president of the recent International Congress of Botanists at its meeting in Zurich on August 8, and Professor Claudet, of Geneva, was elected acting president.

THE British Mycological Society will hold a meeting at Exeter during the week beginning September 23. Professor H. Marshall Ward, of Cambridge University, will give a presidential address.

AMONG the Americans in attendance at the International Congress of Zoology are Professors Wilson of Columbia, Mark of Harvard, Paten of Dartmouth, McMurrich of Michigan, Woodworth of California, Dr. Allen of the American Museum of Natural History, Dr. Elliot of the Field Columbian Museum, Dr. Stiles of the U. S. Department of Agriculture and Mr. Stejneger of the U. S. National Museum. News has not yet reached this country regarding the meeting of the Congress, but about 150 papers have been promised in advance to be presented before seven sections, as follows: (1) General zoology; (2) vertebrata (biology, classification, distribution); (3) vertebrata (anatomy, histology, embryology); (4) invertebrata, except arthropoda; (5) arthropoda; (6) economic zoology (fisheries, etc.); (7) nomenclature. Lec-

tures before the Congress as a whole have been arranged by Professor G. B. Grassi on 'The malaria problem from a zoological standpoint,' by Professor A. Forel on 'The physical characters of ants,' by Professor E. B. Poulton on 'Mimicry and natural selection,' by Professor Wilhelm Branco on 'Fossil human remains' and by Professor Ives Delage on a subject not announced. Dr. P. L. Sclater is expected to exhibit the skull of the *Okapi Johnstoni*, the remarkable mammal recently discovered in the Semliki forest of the Congo State. The entertainments were expected to include an excursion to Potsdam, a theatrical performance, a luncheon by the Berlin Zoological Society and a dinner in the Zoological Gardens. Following the Congress an excursion is planned to Hamburg and Heligoland.

THE American Institute of Electrical Engineers began its annual meeting in New York City on August 14, with a large number of foreign delegates in attendance. The members then proceeded to Buffalo, stopping to visit the works of the General Electric Company at Schenectady, and are this week holding meetings for the presentation of scientific papers and inspecting the electrical equipment installations at the Exposition and at Niagara Falls.

A HISTORICAL Congress will be held in Rome in the spring of 1902. We understand that the history of science will be specially included in the scope of the Congress.

DR. C. W. DANIELS left Liverpool, on July 8, for Sierra Leone, West Africa, to join the sixth malarial expedition of the Liverpool School of Tropical Medicine under Major Ronald Ross. Dr. Daniels was a member of the Royal Commission on Malaria, in which capacity he spent a long time in Central and East Africa recently. He will join Major Ross in Sierra Leone, and will probably proceed to the Gold Coast and Lagos. The expedition is now composed of Major Ronald Ross, Dr. Logan Taylor, Dr. McKendrick (officially attached to the expedition on behalf of the Indian Government), and Dr. Daniels. The seventh expedition of the Liverpool School, which will be despatched to the Gambia, is expected to leave for Bathurst about the end of the present month.

LARGELY through the agency of the 'Semper-virens Society' the State of California has appropriated \$250,000 to purchase and preserve the grove of redwoods near Santa Cruz.

THE exhibits of the German chemical industry at the Paris Exposition, valued at \$150,000, has been presented to the Technological Institute of the University of Berlin.

MR. CARNEGIE has offered \$50,000 to Burlington, Vt., for a library building on the usual conditions. He has also offered a building for Montrose, Scotland.

THE French Society for Colonial Expansion in France has instituted a special branch devoted to the assistance of doctors and chemists who desire to emigrate.

UNIVERSITY AND EDUCATIONAL NEWS.

BY the will of Mrs. Louise Frisbie, bequests amounting originally to \$28,000, but which may now amount to much more, are left to Smith, Vassar and Wellesley Colleges.

MRS. D. BANDY, who recently gave \$25,000 to Eureka College, Illinois, has given the institution land valued at \$60,000, subject to a life interest on the part of her daughter.

PROFESSOR W. VON ZEHENDER, of Munich, has given his valuable ophthalmological library to the University of Bern.

It is reported in the medical journals that the University of Pennsylvania Veterinary Department will be moved to Thirty-ninth and Woodland avenue, instead of to the Flower Farm, on the West Chester Pike, as formerly intended. The reason assigned for the change in the plans is that the department would be too inconvenient for the public on the West Chester Pike, and too far from the university for the students. It is also stated that the work on the new \$60,000 buildings will begin in October.

THE Technical Education Board of the London County Council has directed the higher education subcommittee to inquire and report (a) as to the need and present provision for special training of an advanced kind in connection with the application of science (especially chem-

istry and electricity) to industry ; (b) as to what, if any, developments are needed to secure efficient training in these subjects for senior county scholars and other advanced students who desire to qualify themselves to take leading positions in scientific industries.

A COMMITTEE of the Birmingham City Council has recommended the council to make a grant to the Birmingham University of the proceeds of a halfpenny rate, which would provide an annual sum of about \$25,000.

THE University of Zurich has enlarged its anatomical building. A dissecting room with overhead light to accommodate two hundred students has been added and on the floor below a microscopical room of the same size. There is also a demonstration room with overhead light, a laboratory for anthropology, and a laboratory for advanced embryological study, together with rooms for the director. The old part of the building will be rearranged for a large lecture room, a reading and study room for the students, a museum, and the laboratories for assistants.

THE University at Erlangen announced a summer school for clergymen on the lines of the summer schools for teachers. It appears, however, that not sufficient clergymen felt the need of instruction, and the plan has been abandoned.

J. E. LOUGH, Ph.D. (Harvard), for the past four years professor of psychology at the State Normal School at Oshkosh, Wis., has been appointed to the professorship of psychology in the School of Pedagogy, New York University.

N. O. BOOTH has resigned his position as horticulturist in the University of Missouri to accept a position in the New York Agricultural College at Geneva.

MR. ROLLA R. RAMSEY, Ph.D., Cornell, '01, has been appointed instructor in physics in the University of Missouri. Dr. Ramsey is a graduate of the University of Indiana and has held graduate scholarships at Clark and Cornell. He has also been assistant in physics at Cornell and instructor at Indiana.

DR. VICTOR UHLIG, professor of paleontology at Vienna, succeeds Professor Ed. Suess in the chair of geology.